

## Complete Summary

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### GUIDELINE TITLE

Clinical guideline for the prevention of unplanned perioperative hypothermia.

### BIBLIOGRAPHIC SOURCE(S)

Clinical guideline for the prevention of unplanned perioperative hypothermia. J Perianesth Nurs 2001 Oct; 16(5): 305-14. [47 references]

## COMPLETE SUMMARY CONTENT

### SCOPE

METHODOLOGY - including Rating Scheme and Cost Analysis

### RECOMMENDATIONS

EVIDENCE SUPPORTING THE RECOMMENDATIONS

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

IMPLEMENTATION OF THE GUIDELINE

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT

### CATEGORIES

IDENTIFYING INFORMATION AND AVAILABILITY

## SCOPE

### DISEASE/CONDITION(S)

Unplanned perioperative hypothermia

### GUIDELINE CATEGORY

Management

Prevention

### CLINICAL SPECIALTY

Anesthesiology

Critical Care

Nursing

### INTENDED USERS

Advanced Practice Nurses

Health Care Providers

Nurses

Physicians

## GUIDELINE OBJECTIVE(S)

To provide clinicians with a practical, bedside approach to the prevention, care, and management of the adult surgical patient with unplanned perioperative hypothermia

## TARGET POPULATION

Adult surgical patient

## INTERVENTIONS AND PRACTICES CONSIDERED

1. Identify risk factors
2. Temperature measurement and monitoring
3. Determine patient's thermal comfort and assess for signs and symptoms of hypothermia
4. Institute preventive or active warming measures

## MAJOR OUTCOMES CONSIDERED

- Adverse outcomes
- Patient satisfaction
- Health care costs

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases  
Searches of Unpublished Data

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Electronic searches were conducted of Medline and CINAHL.

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus  
Expert Consensus (Committee)  
Subjective Review

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

## METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses  
Systematic Review

## DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus  
Expert Consensus (Consensus Development Conference)

## DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The American Society of PeriAnesthesia Nurses (ASPA) hosted a Consensus Conference on Perioperative Thermoregulation on February 7, 1998, in Bethesda, MD. A variety of health care disciplines and specialties endorsed and participated in the conference.

Because this conference provided an open forum to discuss current practices regarding temperature management, specific research on perioperative temperature management was reviewed. Consensus on the definitions of normothermia and hypothermia was reached. The final outcome of this conference was the recommendation to establish a development panel to create a clinical guideline for the thermoregulatory management of perioperative patients.

On August 29, 1998, a 10-member multidisciplinary and multispecialty Guideline Development Panel convened in New York, NY, to write the Clinical Guideline for the Prevention of Unplanned Perioperative Hypothermia.

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

## COST ANALYSIS

The cost of perioperative hypothermia varies and can range from the cost of an extra cotton blanket to increased patient morbidity and mortality. Meta-analysis results demonstrate that hypothermia averaging only 1.5°C below normal caused cumulative adverse outcomes, which added \$2,500 to \$7,000 per surgical patient to hospitalization costs. Significant factors associated with elevated costs of patient care include the following:

- Increased length of PACU, intensive care unit, and hospital stay
- Increased red blood cell (RBC), plasma, and platelet use
- Increased need for mechanical ventilation
- Increased cardiac problems and associated costs

Meta-analysis results indicate that patients maintained at normothermic conditions throughout the perioperative period experience fewer adverse outcomes, and thus, health care costs decrease.

## METHOD OF GUIDELINE VALIDATION

Clinical Validation-Pilot Testing  
Clinical Validation-Trial Implementation Period  
Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The Guideline established by the panel was peer reviewed by individuals with expertise and/or special interest in the prevention and management of perioperative hypothermia.

After peer review, the Guideline was pilot tested in 6 healthcare institutions of varying size and location.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

#### Scope and Significance of the Condition

Every patient undergoing surgery is at risk for developing perioperative hypothermia. Contributing factors vary and may increase the risk for hypothermia in the surgical patient. Contributing risk factors include the following:

- Extremes of ages
- Female sex
- Ambient room temperature
- Length and type of surgical procedure
- Cachexia
- Preexisting conditions (peripheral vascular disease, endocrine disease, pregnancy, burns, open wounds, etc)
- Significant fluid shifts
- Use of cold irrigants
- Use of general anesthesia
- Use of regional anesthesia

#### Definitions

Although the literature presents no consistent definitions of normothermia and hypothermia, it is the consensus of the panel experts that normothermia is best defined as a core temperature range from 36°C-38°C (96.8°F-100.4°F).

Hypothermia is defined as a core temperature less than 36°C (96.8°F).

Hypothermia may be present regardless of temperature if the patient describes feeling cold or presents with common signs and symptoms of hypothermia such as shivering, peripheral vasoconstriction, and piloerection.

## Temperature Measurement

Temperature measurement must be accurate and consistent. It is the responsibility of the practitioner to determine the best method for monitoring patient temperature and to use the temperature monitoring device correctly while considering accessibility of the site, patient comfort, and safety. Research indicates that during the perioperative period when core temperature rapidly changes, the relationship between the temperatures measured at various body sites may differ considerably. Core temperature is measured in the pulmonary artery, the distal esophagus, nasopharynx, and tympanic membrane. Core temperature can be estimated using the oral, axillary, and bladder sites. Adjusted skin temperatures and rectal temperatures reflect core temperatures reasonably well but become unreliable during Malignant Hyperthermia Crisis. (See Appendix A in the guideline document) A recent survey found infrared tympanic monitoring to be the preferred route of temperature measurement preoperatively and postoperatively. The correlation of infrared tympanic temperature measurements with core temperature has shown to be good in some studies and poor in others. Research has indicated that the accuracy of the temperature reading is dependent on the operator, patient anatomy, and the instrument.

## Preoperative Patient Management

### Assessment

- Identify patient's risk factors for unplanned perioperative hypothermia (Hudson et al., 1999).
- Measure patient temperature on admission.
- Determine patient's thermal comfort level (ask the patients if they are cold) (Frank et al., 1999).
- Assess for other signs and symptoms of hypothermia (shivering, piloerection, and/or cold extremities) (Sessler, 1997).

### Interventions

- Institute preventive warming measures for patients who are normothermic (see definition in the guideline document). A variety of measures may be used, unless contraindicated. Passive insulation may include warmed cotton blankets, socks, head covering, limited skin exposure, circulating water mattresses, and increase in ambient room temperature (minimum 68°F-75°F) (Sessler, 1997).
- Institute active warming measures for patients who are hypothermic (see definition in the guideline document). Active warming is the application of a forced air convection warming system (Bennett et al., 1994; Kelley et al., 1990; Russell & Freeman, 1995; Krenzischek, Frank & Kelly, 1995; Sessler et al., 1995; Paterson et al., 1999; Elmore et al., 1998; Hudson et al., 1999; Summers, 1990). Apply appropriate passive insulation and increase the ambient room temperature (minimum 68°F-75°F) (Sessler, 1997; Arndt, 1999). Consider warmed intravenous (IV) fluids (Smith et al., 1998).

## Intraoperative Patient Management

### Assessment

- Identify patient's risk factors for unplanned perioperative hypothermia (Hudson et al., 1999).
- Determine patient's thermal comfort level (ask the patients if they are cold) (Frank et al., 1999).
- Assess for other signs and symptoms of hypothermia (shivering, piloerection, and/or cold extremities) (Sessler, 1997).
- Monitor patient's temperature intraoperatively.

Research indicates that the greatest temperature decline occurs during the first hour of surgery. Therefore, frequent temperature monitoring is indicated in all cases to detect and aid in the prevention of hypothermia. Intraoperatively, the anesthesia provider should follow professional association standards of practice for temperature monitoring:

- The American Society of Anesthesiologists recommends that "every patient receiving anesthesia shall have temperature monitored when clinically significant changes in body temperature are intended, anticipated or suspected" (American Society of Anesthesiologists [ASA], 1999).
- The American Association of Nurse Anesthetists recommends that "body temperature shall be intermittently or continuously monitored and recorded on all patients receiving general anesthesia; the means to monitor temperature shall be immediately available for use on all patients receiving local or regional anesthesia and used when indicated" (American Association of Nurse Anesthetists [AANA], 1998).
- In cases in which an anesthesia provider does not participate and the patient is under the care of a perioperative nurse (e.g., local minor surgery or moderate sedation), the temperature should be monitored at the beginning and end of the procedure. In cases lasting longer than 30 minutes, serial temperature measurements should be obtained at least every 30 minutes to monitor temperature trends.

## Intervention

Implement warming methods (Paterson et al., 1999). These methods include but are not limited to the following:

- Apply appropriate passive insulation: warm blankets, socks, head covering, limited skin exposure, and circulating water mattress.
- Increase ambient room temperature. Follow the Association of Perioperative Registered Nurses (AORN) Practice Guidelines for ambient room temperature (temperature of 20°C-24°C or 68°F-75°F) (Sessler, 1997; Frank et al., 1992; Ardnt, 1999).
- Institute active warming: apply forced air warming system (Bennett et al., 1994; Kelley et al., 1990; Russell & Freeman, 1995; Krenzischek, Frank & Kelly, 1995; Paterson et al., 1999; Elmore et al., 1998; Hudson et al., 1999).
- Warm fluids: intravenous and irrigants (Smith et al., 1998).
- Humidify and warm gases: anesthetic.

## Expected Outcome

The patient's core temperature should be maintained at 36°C (96.8°F) or above during the intraoperative phase unless hypothermia is indicated.

## Postoperative Patient Management: Phase I Post Anesthesia Care Unit (PACU)

### Assessment

- Identify patient's risk factors for unplanned perioperative hypothermia.
- Assess temperature on admission to the Phase I PACU (Hudson et al., 1999). If hypothermic, monitor serial temperatures at a minimum of every 30 minutes until normothermia is achieved. If normothermic, assess temperature again before discharge and as ordered by physician.
- Determine patient's thermal comfort level (ask the patients if they are cold) (Frank et al., 1999).
- Assess for signs and symptoms of hypothermia (shivering, piloerection, and/or cold extremities) (Sessler, 1997).

### Interventions

If normothermic, institute preventative warming measures:

- Apply appropriate passive insulation: warm blankets, socks, head covering, limited skin exposure, and circulating water mattress.
- Increase ambient room temperature (minimum 68°F-75°F) (Sessler, 1997; Ardnt, 1999).
- Assess patient's thermal comfort level every 30 minutes (Frank et al., 1999).
- Observe for signs and symptoms of hypothermia (shivering, piloerection, and/or cold extremities) (Sessler, 1997).
- Reassess temperature if patient's thermal comfort level decreases and/or signs of hypothermia are present.
- Measure patient's temperature before discharge.

If hypothermic, initiate active warming measures:

- Apply forced air warming system (Bennett et al., 1994; Kelley et al., 1990; Russell & Freeman, 1995; Krenzischek, Frank & Kelly, 1995; Paterson et al., 1999; Elmore et al., 1998; Hudson et al., 1999; Summers, 1990).
- Apply passive insulation: warm blankets, socks, head covering, limited skin exposure, and circulating water mattress.
- Increase ambient room temperature (minimum 68°F-75°F) (Sessler, 1997).
- Warm fluids: intravenous (Smith et al., 1998).
- Humidify and warm gases: oxygen.
- Assess temperature and patient's thermal comfort level at least every 30 minutes until normothermia is reached (Frank et al., 1999).

### Expected Outcome

Patient core temperature will be a minimum of 36°C (96.8°F) before discharge from PACU. All signs and symptoms of hypothermia should be resolved before discharge. Patient should describe feeling an acceptable level of warmth.

Preventive warming measures and observation for hypothermia will continue in Phase II PACU Ambulatory Surgery Unit (ASU) or on the medical/surgical unit.

Exceptions. (1) Patient is unable to verbalize feeling cold (e.g., intubated patient).  
(2) Patient may be discharged to a critical care unit despite being hypothermic where active warming measures will continue.

## Postoperative Patient Management: Phase II PACU (ASU)

### Assessment

- Identify patient's risk factors for unplanned perioperative hypothermia (Hudson et al., 1999).
- Measure patient's temperature on admission.
- Determine patient's thermal comfort level (ask the patients if they are cold) (Frank et al., 1999).
- Assess for signs and symptoms of hypothermia (shivering, piloerection, and/or cold extremities) (Sessler, 1997).

### Intervention

If normothermic, institute preventative warming measures:

- Apply appropriate passive insulation: warm blankets, socks, head covering, limited skin exposure, and circulating water mattress.
- Increase ambient room temperature (minimum 68°F-75°F). (Sessler, 1997; Arndt, 1999).
- Assess patient's thermal comfort level every 30 minutes (Frank et al., 1999).
- Observe for signs and symptoms of hypothermia (shivering, piloerection, and/or cold extremities) (Sessler, 1997).
- Reassess temperature if patient's thermal comfort level decreases and/or signs of hypothermia are present.
- Measure patient's temperature prior to discharge.
- Implement active warming measures if patient complains that they are cold or become hypothermic (Bennett et al., 1994; Kelley et al., 1990; Russell & Freeman, 1995; Krenzischek, Frank & Kelly, 1995; Paterson et al., 1999; Elmore et al., 1998; Hudson et al., 1999; Summers, 1990).
- Instruct patient and responsible adult of methods to maintain normothermia at home (i.e., warm liquids, blankets, socks, increased clothing, increased room temperature).

If hypothermic, institute active warming measures:

- Active warming is the application of a forced air warming system (Bennett et al., 1994; Kelley et al., 1990; Russell & Freeman, 1995; Krenzischek, Frank & Kelly, 1995; Paterson et al., 1999; Elmore et al., 1998; Hudson et al., 1999; Summers, 1990).
- Apply appropriate passive insulation: warm blankets, socks, head covering, limited skin exposure, and circulating water mattress.
- Increase the ambient room temperature (minimum 68°F-75°F) (Sessler, 1997; Arndt, 1999).
- Consider warmed IV fluids (Smith et al., 1998).

### Expected Outcome

Patient core temperature should be a minimum of 36°C (96.8°F) before discharge. All signs and symptoms of hypothermia should be resolved before discharge. Patient should describe feeling an acceptable level of warmth. Signs and symptoms of hypothermia will be absent. Patient and/or responsible adult should describe methods of maintaining normothermia at home.

#### CLINICAL ALGORITHM(S)

The original guideline document contains a thermal management flow chart.

### EVIDENCE SUPPORTING THE RECOMMENDATIONS

#### REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

#### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is not specifically stated for each recommendation.

### BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

#### POTENTIAL BENEFITS

Effective prevention and management of unplanned perioperative hypothermia

#### POTENTIAL HARMS

Not stated

### IMPLEMENTATION OF THE GUIDELINE

#### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

#### IMPLEMENTATION TOOLS

Clinical Algorithm

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

### INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

#### IOM CARE NEED

Staying Healthy

IOM DOMAIN

Effectiveness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Clinical guideline for the prevention of unplanned perioperative hypothermia. J Perianesth Nurs 2001 Oct; 16(5): 305-14. [47 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

2001 Oct

### GUIDELINE DEVELOPER(S)

American Society of PeriAnesthesia Nurses

### SOURCE(S) OF FUNDING

American Society of PeriAnesthesia Nurses

### GUIDELINE COMMITTEE

Not stated

### COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Not stated

### FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

### GUIDELINE STATUS

This is the current release of the guideline.

An update of this guideline is planned to be released in 2006.

### GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American Society of PeriAnesthesia Nurses Web site](#).

Print copies: Available from the American Society of PeriAnesthesia Nurses, 10 Melrose Avenue, Suite 110, Cherry Hill, NJ 08003-3696

#### AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Jeran, L. Clinical guideline for the prevention of unplanned perioperative hypothermia. Patient temperature: an introduction to the clinical guideline for the prevention of unplanned perioperative hypothermia. 2001 Oct.

Print copies: Available from the American Society of PeriAnesthesia Nurses, 10 Melrose Avenue, Suite 110, Cherry Hill, NJ 08003-3696

#### PATIENT RESOURCES

None available

#### NGC STATUS

This NGC summary was completed by ECRI on September 23, 2004. The information was verified by the guideline developer on October 29, 2004.

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